

Estimating the prevalence of influenza A virus antibodies in Ohio exhibition swine

Amber M. Kihm, Jacqueline M. Nolting, and Andrew S. Bowman

INTRODUCTION

Influenza A viruses (IAV) cause highly contagious respiratory disease in many species including humans and swine. This viral agent is currently undergoing rapid evolution within the U.S. swine population where it is endemic.⁴ Agricultural fairs provide a swine-human interface suitable for interspecies transmission of IAVs, which are spread by droplets, through the air, and through direct contact. When an IAV strain normally circulating in swine infects a human, it is termed 'variant' (v).³ In the U.S. since 2011, there have been 345 human cases of H3N2v, resulting in 20 hospitalizations and one death. Nearly one third of these cases occurred in association with exhibition swine at agricultural fairs in Ohio.¹

Conducting active surveillance for IAV in exhibition swine allows for the investigation of contemporarily circulating IAVs but does not provide evidence for IAV history. Antibody detection is needed to gain insight into previous IAV exposure in this swine population, whether it be due to natural infection or vaccination.



OBJECTIVE

To estimate the prevalence of influenza A virus antibodies present in exhibition swine sera at one Ohio agricultural fair, 2011 – 2015.

METHODS

Collection and Preparation of Samples

- Blood was collected from exhibition swine
- Serum separated by centrifugation of clotted blood samples

Enzyme-Linked Immunosorbent Assay (ELISA)

- Tested for antibodies against IAV nucleoprotein using IDEXX AI Multi-Screen Ab Test using the manufacturer's protocol.²

Data Analysis

- Plate absorbance read using spectrometer
- Mean absorbance calculated for positive and negative control to validate test
- Sample absorbance readings used to calculate sample to negative (S/N) ratio for each sample to determine if positive or negative
- Positive samples have an S/N ratio ≤ 0.9
- Strong positives have an S/N ratio ≤ 0.5
- Weak positives have an S/N ratio of 0.51 to 0.9

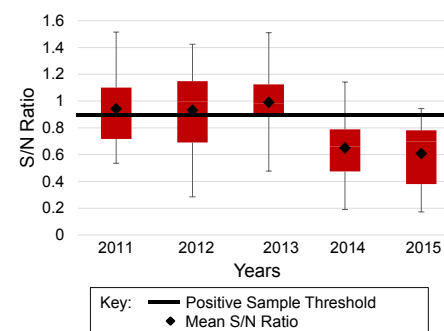


RESULTS

Figure 1. Sera Results 2011-2015

Year	No. Samples Collected	No. Positive For IAV Antibodies	Percent IAV Isolation Positive	Percent Positive IAV Antibodies
2011	43	23	58%	51%
2012	40	18	68%	45%
2013	40	11	23%	28%
2014	40	33	65%	83%
2015	26	25	0%	96%
TOTAL	189	110	45%	58%

Figure 2. Swine Sera S/N Ratios 2011-2015



- 58% total prevalence of antibodies against IAV from 2011-2015
- Parallel study on active IAV surveillance at same agricultural fair allows for comparison of virus isolation and prevalence of antibodies against IAV
- Significant increase in prevalence of antibodies against IAV in recent years, 2014-2015, using a two-sided z-test**

DISCUSSION

Detection of antibodies against IAV indicate that Ohio exhibition swine have been previously exposed to IAV prior to entering the agricultural fair. The naïve immune systems of the general public visiting agricultural fairs are at risk to IAV exposure through infected swine contact. Therefore, slowing intra- and inter-species transmission of IAV benefits both swine and public health. It was not required that the swine at this agricultural fair be vaccinated against IAV.

CONCLUSIONS

The increase in prevalence of antibodies against IAV in 2014 and 2015 could be due to:

- An increase in IAV vaccine use in the exhibition swine population
- An increase in exposure to IAV prior to swine entering the agricultural fair

FUTURE DIRECTIONS

Determining whether previous IAV exposure is due to natural infection or vaccination to answer the following questions:

- How well do these antibodies protect exhibition swine against IAV infection?
- Can IAV vaccines be made more effective at slowing transmission of IAV between swine?

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